Welfare Analysis of Regulating Mobile Termination Rates in the UK (with an Application to the Orange/T-Mobile Merger)

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Autoridade da Concorrência
January 31st 2011
A **Mobile termination rate (MTR)** is the price that a mobile network operator (MNO) charges to "terminate" calls from other networks.
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Almost everywhere sectoral regulators have imposed a cap on MTRs, often (but not always) equal for FTM and MTM calls - why?
Will MNOs set low or high MTRs?

- Economic theory shows that
  - MNOs want to set a high FTM termination rate ("competitive bottleneck")
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- MNOs want to set high or low MTM termination rates depending on the prevailing types of retail tariffs: (with differentiation between on- and off-net calls)
  - Linear / pre-paid tariffs: high MTRs reduce competitive intensity
  - Two-part / post-paid tariffs: low MTRs reduce competitive intensity
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    - Linear / pre-paid tariffs: high MTRs reduce competitive intensity
    - Two-part / post-paid tariffs: low MTRs reduce competitive intensity

- In practice most MNOs set high MTRs
Economic Effects of High MTRs

- **FTM calls:**
  - Transfer of surplus from fixed to mobile consumers (results in "Waterbed effect") and / or MNOs
  - Inefficiency in fixed market through high FTM prices
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- **FTM calls:**
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  - Inefficiency in fixed market through high FTM prices

- **MTM calls:**
  - Inefficiency in mobile market through high MTM off-net prices
  - Transfer of surplus from MNOs to subscribers (two-part/post-paid tariffs)
  - Transfer of surplus from subscribers to MNOs (linear/pre-paid tariffs)
  - Transfer of surplus between asymmetric networks
MNOs have SMP in the markets of termination of calls to own subscribers, and there is inefficiency
Regulatory Response

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- Thus MTR caps are imposed, with strong downward trend over last decade.
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- EU recommendation of May 2009: MTRs should converge to LRIC, where "increment" is mobile termination as additional service.
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Thus MTR caps are imposed, with strong downward trend over last decade.

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Means MTR target in the 1–2 Eurocent range.
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UK: Ofcom Consultation of 2009

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- **Ofcom consulted on different targets for lowering MTRs**
  - LRIC or LMRC
  - Reciprocity with fixed networks (MTR = FTR)
  - Bill-and-keep (zero MTRs)
  - Capacity-based charges (not in our paper)
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- Our paper: Calibrated model of UK mobile and fixed markets in order to disentangle effects and compare options
The Model

- Based on multiple network competition model of Hoernig (2010), CEPR Discussion paper 8060
- 5 or 6 asymmetrically-sized mobile networks competing directly against each other
- Two-part tariffs with on/off-net discrimination
- Call externalities
- Model computes equilibrium prices and profits
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- Fixed retention on FTM calls
- Sorry, no formulas this time (they are in the paper)
Calibration

- Ofcom (2009) information on subscribers, demand
- Calibrated linear demand function
- Real market shares (held constant for short-run effects)
- Own estimate of marginal costs
- Calibration of network differentiation parameter and stability check
- Consider different levels of call externality $\beta$
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- Real market shares (held constant for short-run effects)
- Own estimate of marginal costs
- Calibration of network differentiation parameter and stability check
- Consider different levels of call externality $\beta$
- All results are
  - in millions of pound sterling per year
  - in comparison to status quo
- Fixed and mobile markets considered separately and in aggregate
Total Welfare in Mobile and Fixed Markets

Aggregate Change in Welfare

\[
\beta = 0 \quad \beta = 0.25 \quad \beta = 0.5 \quad \beta = 0.75 \quad \beta = 1
\]

\begin{align*}
\text{LRMC} & \quad 367 & 648 & 1023 & 1537 & 2272 \\
\text{Recip} & \quad 366 & 675 & 1086 & 1651 & 2459 \\
\text{B & K} & \quad 360 & 674 & 1091 & 1665 & 2485 \\
\end{align*}

- Low call externalities: MTR at cost socially optimal
- High call externalities: MTR below cost socially optimal
- Social welfare predicted to increase by between £0.3bn and more than £2bn, depending on the strength of the call externality
Consumer Surplus in Mobile and Fixed Markets

**Aggregate Change in Consumer Surplus**

<table>
<thead>
<tr>
<th></th>
<th>( \beta = 0 )</th>
<th>( \beta = 0.25 )</th>
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</tr>
</thead>
<tbody>
<tr>
<td>LRMC</td>
<td>29</td>
<td>217</td>
<td>464</td>
<td>800</td>
<td>1276</td>
</tr>
<tr>
<td>Recip</td>
<td>-31</td>
<td>174</td>
<td>443</td>
<td>810</td>
<td>1328</td>
</tr>
<tr>
<td>B &amp; K</td>
<td>-51</td>
<td>157</td>
<td>429</td>
<td>800</td>
<td>1326</td>
</tr>
</tbody>
</table>

- Low call externalities: MTR below cost reduces CS
- High call externalities: MTR *below* cost increases CS
- Consumer surplus increases less than total welfare
- Implies that networks also gain on aggregate
Fixed Market

- Changes do not depend on call externalities

**Change in Fixed Market Values**

<table>
<thead>
<tr>
<th></th>
<th>Welfare</th>
<th>Consumer Surplus</th>
<th>Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRMC</td>
<td>541</td>
<td>473</td>
<td>68</td>
</tr>
<tr>
<td>Recip</td>
<td>676</td>
<td>592</td>
<td>84</td>
</tr>
<tr>
<td>B &amp; K</td>
<td>712</td>
<td>623</td>
<td>88</td>
</tr>
</tbody>
</table>

- Welfare in fixed market increases due to lower FTM prices
- Consumer surplus increases due to lower FTM transfers
- Profits increase due to higher FTM quantities
- Both consumers and the fixed network benefit
Welfare in Mobile Market

<table>
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<tr>
<th>Change in Mobile Welfare</th>
<th>$\beta = 0$</th>
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<tr>
<td>LRMC</td>
<td>-174</td>
<td>107</td>
<td>481</td>
<td>996</td>
<td>1731</td>
</tr>
<tr>
<td>Recip</td>
<td>-310</td>
<td>-1</td>
<td>410</td>
<td>975</td>
<td>1783</td>
</tr>
<tr>
<td>B &amp; K</td>
<td>-352</td>
<td>-38</td>
<td>380</td>
<td>953</td>
<td>1773</td>
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- Welfare decreases: reduced transfers from fixed market
- Welfare decreases: lower off-net prices
- The second effect dominates with medium to high call externalities
Consumer Surplus in Mobile Market

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- **Mobile CS decreases strongly:**
  - Reduced transfers from fixed market (Waterbed effect)
  - Higher fixed fees due to smaller tariff-mediated network effects
- **Mobile CS increases with high call externalities** due to lower off-net prices
- Even mobile consumers may gain from reduced MTRs
The Merger between T-Mobile and Orange

- The UK had until 2009 five MNOs, O2 (28%), Vodafone (23%), Orange (21%), T-Mobile (16%), H3 (6%), and the MVNO Virgin (6%)
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- The Orange/T-Mobile merger created an MNO with 37% market share
- Orange/T-Mobile predicted cost savings of about £400m
- The European Commission cleared the merger in March 2010
- Our question: How does the merger affect consumers under different MTR scenarios?
- Following tables show changes in £m
Merger under 2010/11 MTRs

- Let’s for a start keep MTRs where they are

### Merger with 2010/11 MTRs

<table>
<thead>
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<th>$\beta$</th>
<th>W</th>
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<tr>
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- Merger increases welfare with low call externalities!
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- In any case, consumers suffer and profits increase
Merger under B & K, constant market shares

- Now assume Bill & Keep as the most extreme change
- Keep market shares constant for now

### Short-run Effects of Merger under B & K

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<th>π</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>-1,983</td>
<td>1,985</td>
</tr>
<tr>
<td>0.2</td>
<td>2</td>
<td>-2,065</td>
<td>2,067</td>
</tr>
<tr>
<td>0.4</td>
<td>1</td>
<td>-2,171</td>
<td>2,172</td>
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<tr>
<td>0.6</td>
<td>-1</td>
<td>-2,309</td>
<td>2,308</td>
</tr>
<tr>
<td>0.8</td>
<td>-8</td>
<td>-2,491</td>
<td>2,483</td>
</tr>
<tr>
<td>1</td>
<td>-29</td>
<td>-2,743</td>
<td>2,715</td>
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- Small welfare effect (similar call prices)
- Similar large reduction in consumer surplus
- Profits increase by same amount
Merger under B & K, symmetric market shares

- Bill & Keep might lead to more similar market shares in the long run
- So let’s check symmetric market shares right away

<table>
<thead>
<tr>
<th>Merger under B &amp; K with Symmetry</th>
<th>( \beta = 0 )</th>
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<th>( \beta = 0.4 )</th>
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<td>1,336</td>
<td>1,421</td>
<td>1,533</td>
<td>1,686</td>
</tr>
</tbody>
</table>

- Again, only a small welfare effect
- Consumer surplus reduction is smaller but still large
- Profits continue to increase by same amount
Conclusions

- Ofcom’s proposed MTR reductions have multiple effects
  - Fixed market participants gain in welfare and surplus
  - Mobile welfare increases, but mobile consumers may lose due to lower transfers and reduced competitive intensity
  - Mobile consumers may still gain overall due to lower off-net prices if call externalities are important
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- Results do not much differ between Ofcom’s proposals
- Bill & Keep can be optimal
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- Results do not much differ between Ofcom’s proposals
- Bill & Keep can be optimal
- Orange/T-Mobile merger
  - Lower MTRs reduce adverse welfare effects of the merger
  - But consumers lose out anyway (and MNOs gain)
Thank you!